On the western part of the island, where the principal exposure occurs, the strata have a dip of twenty-two degrees to the southwest, reminding us that during the period of upheaval through which this district passed, Great Manitou by no means fared so well as its sister island.

On the third largest island of the group there are also indications of a stratified formation, but in this case, as in the other referred to, the whole is so covered with drift and rubbish and densely wooded as to render it at present practically indeterminable.

The islands are not only conveniently and pleasantly situated, but are also one of the most delightful and healthful summer resorts in this whole northern region. The student of geology will always find a seasonable visit to these islands a delightful pastime, and will be amply rewarded in being afforded an opportunity of studying some features of geological science seldom experienced, and which assist us materially in correctly interpreting the past history of the earth. Some of the fossils found on the islands are in themselves interesting objects of study, and beautiful illustrations of that wisdom and skill everywhere to be seen in the Creator's work. And while they are important as evidences of past history and assist in determining to some extent the very great age of our world, they are also no less significant in demonstrating the eternity of Him who "before the mountains were brought forth, or ever the earth and the world were formed," from everlasting to everlasting is God.

In contemplating the glory and grandeur of the Creative handiwork, and considering the great antiquity of the world on which we dwell, may we not well adopt the language of inspiration and say: "Great and marvellous are thy works, Lord God Almighty;" "Of old hast thou laid the foundations of the earth."

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The 42nd meeting of the American Association opened at Madison, Wisconsin, on August 17th. The following were the officers of the meeting, new secretaries having to be elected in the case of Sections E and G, Messrs. Hill and Coville being absent on the opening of the meeting: President, William Harkness, Washington, D. C.; Vice Presidents.—A. Mathematics and Astronomy—C. L. Doolittle, South Bethlehem, Pa. B. Physics—E. L. Nichols, Ithaca, N. Y. C. Chemistry—Edward Hart, Easton, Pa. D. Mechanical Science and Engineering—S. W. Robinson, Columbus, O. E. Geology and Geography—Chas. D. Walcott, Washington, D. C. F. Zoölogy—Henry F. Osborn, New York, N. Y. G. Botany—Charles E. Bessey, Lincoln, Neb. H. Anthropology—J. Owen Dorsey, Tacoma Park, Md. I. Economic Science and Statistics—William H. Brewer, New Haven, Conn. Permanent Secretary, F. W. Putnam, Cambridge (office Salem), Mass. General Secretary, T. H. Norton, Cincinnati, Ohio. Secretary of the Council, H. L. Fairchild, Rochester, N. Y. Secretaries of the Sections. A. Mathematics and Astronomy—C. A. Waldo, Newcastle, Ind. B. Physics—W. LeConte Stevens, Troy, N. Y. C. Chemistry—H. N. Stokes, Chicago, Ill. D. Mechanical Science and Engineering—D. S. Jacobus, Hoboken, N. J. E. Geology and Geography—W. H. Hobbs, Madison, Wis. F. Zoölogy—L. O. Howard, Washington, D. C. G. Botany—B. T. Galloway, Washington, D. C. H. Anthropology—Warren K. Moorehead, Xenia, O. I. Economic Science and Statistics—Nellie S. Kedzie, Manhattan, Kan. Treasurer, William Lilly, Mauch Chunk, Pa.

The addresses of the Vice Presidents were delivered before their respective sections in the afternoon, and they were as follows: Vice President Nichols, before Section of Physics; subject, "Phenomena of the Time Infinitesimal." Vice President Dorsey, before Section of Anthropology; subject, "The Biloxi Indians of Louisiana." Vice President Walcott, before Section of Geology and Geography; subject, "Geologic Time as Indicated by the Sedimentary Rocks of North America." Vice President Brewer, before Section of Economic Science and Statistics; subject, "The Mutual Relations of Science and Stock-Breeding." Vice President Osborn, before Section of Zoölogy; subject, "The Rise of the Mammalia." Vice President Doolittle, before Section of Mathematics and Astronomy; subject, "Variations of Latitude." Vice President Bessey, before section of Botany; subject, "Evolution and Classification." Vice President Hart, before Section of Chemistry; subject, "Twenty-five Years' Progress in Analytical Chemistry." Vice President Robinson, before Section of Mechanical Science and Engineering; subject, "Training in Engineering Science."

Vice President Walcott in his address before Section E, Geology, referred to the various estimates that had been made as to the length of geological time, these varying from a minimum of 3,000,000 to a maximum of 1,200,000,000 years. His own studies, based largely upon the Paleozoic sediments of the Cordilleran area, gave a mean between these. The following table gives the estimated time for each of the larger geological eras:

Cænozoic, - - -	2,900,000
Mesozoic, - - - -	7,240,000
Paleozoic, - - -	17,500,000
Algonkian, - - - -	17,500,000
Archean, - - - - -	?
Total, - - -	$45,140,000

He stated his belief in the theory that the deep seas and the continental areas are permanent, and thought that the main outlines of the North American continent were laid down as far back as Archean time. Cambrian sediments on either side of the continent are of such extent as to justify the belief, or rather necessitate the belief, that extensive continental masses were near at hand. Thirty thousand feet of sediment in the Rocky Mountain area, and nearly as much in the Appalachian, were indicative of long lapses of time. The sediments of the Rocky Mountains were deposited over an area of at least 400,000 square miles and probably of 800,000. This area extended from the Gulf of Mexico to the Arctic Ocean.

Many statements were made as to the rate of denudation and deposition of calcareous and mechanical sediments. Estimated at the rate of deposit of calcareous sediments now being formed, it was calculated that about 600,000 years would be required to form a deposit of limestone twenty-two feet in thickness. It was estimated that about 47,000,000 years would be required, at this rate, to form the deposit of calcium carbonate in the Cordilleran area. But reducing this fifty per cent for any possible change of conditions, and then taking off a further twenty-five per cent for special conditions affecting deposition, 16,000,000 years would remain for the accumulation of the calcareous sediments. To this must be added time for mechanical deposits, and putting this at its lowest possible term of 1,500,000 years, we have the 17,500,000 years for the Paleozoic time given above.

Professor Osborn, in addressing Section F upon the rise of the mammalia, dwelt especially upon the methods employed by paleontologists, and upon the broad generalizations that had been made by students of fossil mammals. Among these was the generalization of Marsh, that all early types of mammalia had small brain cavities.

Cope had shown by the growth of the feet that all early types had five toes upon both the fore and hind feet and

that the foot rested upon the sole. He had also shown that while the primitive types possessed cone-shaped teeth, the more differentiated they became the more complex the teeth were. An interesting statement in regard to the dental formulas of various orders was given. Without going into details, it may be said that the speaker argued for the three great groups of mammals,—monotremes, marsupials and placentals,—a common origin far back of Jurassic times, for the three were then plainly differentiated. These classes arose from a promammalian type, which was, in its turn, an offshoot from a still simpler form, a second offshoot from which developed into the reptilian type of life. The horse he considered as originating on the North American continent, and he pointed out the interesting fact that the disappearance of many of the huge forms of mammals that once peopled our western plains seemed co-incident with the introduction of grasses.

Professor Bessey, before Section G (Botany), gave an excellent address upon classification. He pointed out the anomalous fact that while botanists have long recognized that the present scheme of classification was defective, they still adhered to it. Theoretically discarding it, practically they used it. He showed that there may be degradation as well as advancement in evolution, and that what seemed the lowest forms of dicotyledons, from their floral structure, were not necessarily primitive types. He therefore interpolated the apetalous orders of the ordinary classifications among the polypetalæ, as degraded types of polypetalous flowers. He outlined what seemed to him to be a natural classification, considering the Ranunculaceæ as the most primitive flowers. The greatest deviation, therefore, from this type was the highest in organization. He believed that with but little modification the sequence of orders in our modern text books could be used to express the natural relationships of plants. Of course such a scheme as a lineal arrangement was out of the question. He, in common with many others, recognized the Compositæ as the most highly organized of the dicotyledons, and the Orchideæ were placed at the head of the monocotyledons.

In the general session of Thursday evening the retiring president, Professor LeConte, of California, delivered an address upon the "Origin of Mountains." In opening, he defined a mountain as the result of a single earth effort, occupying a short or a very long time, while a mountain range was the result of a succession of earth throes. The thickness of the strata of mountains varies, but it is always great. In the Appalachians the Paleozoic is 40,000 feet thick. The Mesozoic of the Alps is 50,000 feet, and the Cretaceous of California is 20,000 feet. The sediments of the Appalachians thin out to the west to only one or two thousand feet, so that mountains may be considered as lines of exceptionally thick sediments. They are, at the same time, lines of exceptionally coarse sediments. Foldings and faults are also characteristic of these features of the earth, the folds being single or many, and the faults being sometimes of enormous extent. Faults of 20,000 feet occur in our western region. After this general discussion of features, the causes were considered. There are both formal and physical explanations. The first explain the cause from the geologists' point of view, and the second from that of the physicist. The first may explain one or more of the phenomena, but the last must explain all of them. Various illustrations were given of these, and then the formal explanation of facts was taken up. Mountains are born of sea-margin deposits, the loaded sea bottoms inducing sinking of the denuded land surface, and the mountains are formed by lateral crushing and upthrust. He did not believe in the theory of a liquid interior, with a solid crust, stating that a globe as solid as glass or steel would assume the oblate spheroid form, as the result of rotation. He argued at length in favor of the lateral thrust origin of mountains, and examined objections urged against it. He also outlined other theories of mountain origin, and pointed out their defects, declaring, however, his entire willingness to give up his theory whenever any better one had been presented.

THE CORNELL MIXTURE.

BY M. V. SLINGERLAND, CORNELL EXPERIMENT STATION, ITHACA, N. Y.

LAST winter, while experimenting in the making of the different insecticides and fungicides, I succeeded in forming a combination which, at the time, seemed to be an almost perfect panacea for all the insect and fungoid ills that might affect the fruit grower. When it was shown to Professor Bailey he immediately dubbed it "The Cornell Compound or Mixture."

In making the mixture I combined the following well-known insecticides and fungicides: Paris green, kerosene emulsion and Bordeaux mixture. Simple enough, was it not? And what a field of possibilities and probabilities it seemed to cover when the theory of the combination is rightly understood. In the Paris green (which I prefer to London purple, on account of its containing less soluble arsenic, and is thus less liable to injure tender foliage, and still better, the copper of the Paris green gives it noticeable fungicidal properties) we have the best, cheapest and most practicable insecticide for all biting or chewing insects like the codlin moth, the potato beetle, and all the leaf-eating caterpillars and beetles. The kerosene emulsion is also well known as the best, cheapest and most practicable insecticide for general use against all insects which obtain their food by sucking it through slender beaks with which they pierce the tissues of the plant. Familiar examples of this group of insects are the pear psylla, the plant-lice and the squash bug. And finally, the Bordeau mixture, which now ranks first among the fungicides in effectiveness against the worst fungoid diseases, like the apple scab, the potato blight and rot, and the plum and peach fruit rot. One can thus understand what a destructive power there seemed to lurk behind the mask of the Cornell mixture.

Many experimenters have shown that when the Bordeaux and Paris green are combined, the destructive effect of neither is lessened, and we know that the lime of the Bordeaux mixture converts all of the soluble arsenic of the Paris green into an insoluble compound, thus allowing the use of the arsenite at nearly twice the strength usually used without danger to tender foliage. The two are easily combined and are to be recommended for general use.

Attempts have been made to combine the insecticides Paris green for biting insects, and kerosene emulsion for sucking insects, but without success; the arsenite cannot be made to unite satisfactorily with the oily lighter emulsion. I have seen no accounts of any trials to combine the Bordeaux mixture with kerosene emulsion. Such a combination strongly recommends itself to pear growers especially, who have the pear psylla to fight, and who wish to exterminate the scab at the same time. My experiments in this line were suggested by a large pear grower who had these foes to meet.

My Bordeaux and emulsion were made according to the directions which are appended below.* When the directions were carefully followed I found that I could quite readily combine the two in any proportions required, and the resulting mixture remained stable for weeks; and in fact the Bordeaux, as a mechanical mixture, was improved, for the emulsion held the lime in suspension, so that its tendency to settle to the bottom, and thus require con-